1. Identification data:	
Name of the institution:	Autonomous University of Nuevo Leon
Dependency name:	Faculty of Medicine
Name of the educational program:	Clinical Chemistry
Name of the learning unit:	Blood bank and transfusion medicine
Total classroom-theory and/or practical hours:	100
Classroom frequencies per week:	5 hours
Total extra classroom hours:	20
Type of modality:	Schooled
Type of academic period:	Sixth semester
Type of learning unit:	Mandatory
Curriculum area:	ACFP-F
UANL Credits:	4
Date of preparation:	04/20/18
Last Update Date:	

2. Presentation:

The Blood Bank and Transfusion Medicine learning unit is made up of four phases which are integrated and provide the basis for the student to be able to perform adequately in a Blood Bank.

All the elements of competence that constitute the analytical program, on which the UA lesson plan will be built, will also be identified. To this end, the teaching tools, strategies and resources that provide the student with meaningful learning and therefore the development of the competencies planned in the analytical program will be analyzed in each of the phases.

To this end, the learning unit develops a training sequence based on 4 phases:

In the first phase, Introduction to the blood bank, the importance of the blood bank and its relationship with transfusion medicine are analyzed.

In the second phase, which corresponds to the Guidelines for the selection of blood donors, the acceptance criteria are analyzed, either rejection of the donors of blood of agreement to the regulations current, for see if a candidate is suitable for donate blood.

In the third phase, Blood Component Processing, the processes carried out in a blood bank are analyzed in accordance with current regulations.

The fourth phase, Compatibility and blood transfusion, analyzes blood compatibility tests (blood crossmatch) for the correct transfusion of blood components in accordance with current regulations.

To complete the Integrative Learning Product, the student must complete a written assessment corresponding to the resolution of clinical cases in transfusion medicine and blood banking.

3. Propósito(s):

This Learning Unit (UA) contributes to the graduate profile by acquiring the necessary procedural skills and techniques used for the obtaining and preparation of the components blood and he recruitment optimum blood donors; in addition to strict control in quality assurance, legal and ethical aspects associated with the donation, collection, preparation, conservation and clinical use of blood components and materials related.

The learning unit collaborates with three general competencies, allowing graduates to develop traditional and cutting-edge research methods and techniques to ensure the quality of blood components and safe blood transfusion. It promotes the values of truth, equity, honesty, professional ethics, solidarity and responsibility, fostering altruism. and the responsibility social in his scope staff and professional for keep the reliability of the evidence carried out in he bank of blood and the transfusion medicine. During the UA HE build proposals innovative for promote the blood donation, raising awareness in society of the importance of same.

Regarding specific competencies, the UA provides knowledge for obtaining, handling, storing and analyzing blood components; it also provides the skills to interpret and validate tests performed in a blood bank and to guarantee the quality of blood components according to the current quality standards that apply to blood banks.

The learning unit is taught in the sixth semester and is related to various UA reviewed in previous semesters, such as: Hematology, which provides the diagnostic criteria for hematological diseases and other etiologies that require follow-up by transfusion medicine and with Immunology that you provides the bases of the answer immune and of the applied analytical methodologies. Within the learning units of advanced semesters it is related to Clinical Pathology, Course for general evaluation, graduation and the professional practices, providing them the knowledge required for the decision making in the practice of transfusion medicine and performance at the blood bank.

4. Competencies of graduates profile:

General competencies to which this learning unit contributes:

- *Competencies instrumentals:*

8. Use traditional and cutting-edge research methods and techniques for the development of their academic work, the exercise of their profession and the generation of knowledge.

- *Personal and interaction skills social:*

11. Practice the values promoted by UANL: truth, equity, honesty, freedom, solidarity, respect for life and others, peace, respect for nature, integrity, ethical behavior and justice, in their personal and professional spheres to contribute to building a sustainable society.

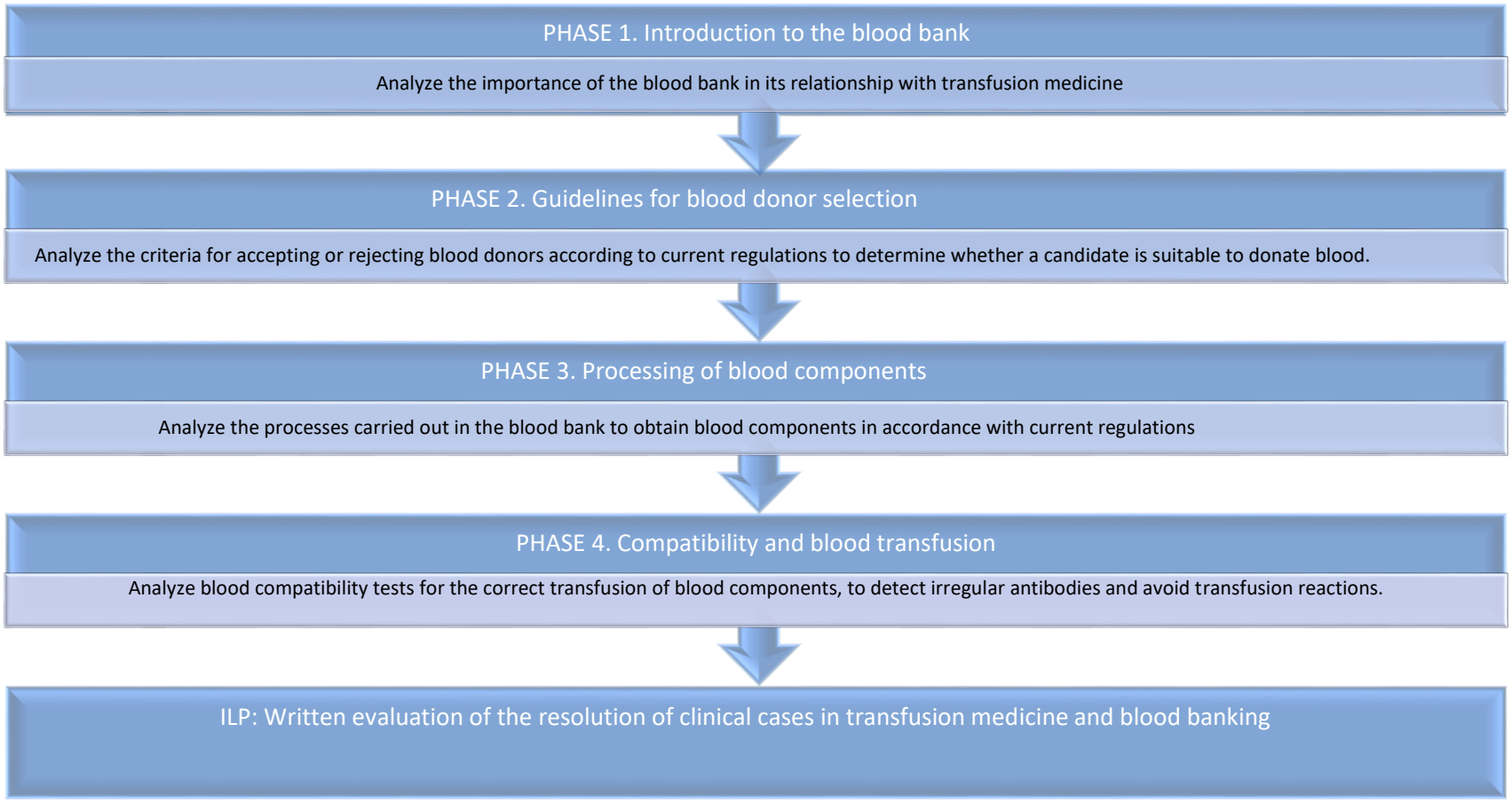
- *Competencies integrative:*

12. Build innovative proposals based on a holistic understanding of reality to help overcome the challenges of the interdependent global environment .

Specific competencies of the graduate profile to which the learning unit contributes:

2. Execute physical, chemical and biological procedures in the obtaining, handling, storage and analysis of samples to contribute to a reliable clinical, toxicological, chemical, food, forensic and environmental diagnosis.
6. Interpret the results of analysis based on established criteria that allow for timely and pertinent decision-making in clinical, toxicological, chemical, food, forensic and environmental.
7. Ensure the reliability of the analytical results obtained by applying quality control guidelines as established by laboratory policies for the correct taking of decisions

5. Graphic representation:



6. Structuring in stages or phases:
Phase 1: Introduction to the Blood Bank **Competence element(s):** Analyze the importance of the blood bank, in its relationship with transfusion medicine, for decision-making in the work field.

Evidence of learning	**Performance criteria**	**Learning activities**	**Contents**	**Resources**
1. Written report of the interpretation and analysis of tests used in transfusion medicine, to identify discrepancies in the ABO system and Rh.	Analyze clinical cases individually. Reports the results obtained from blood group discrepancies in patients and blood donors. Interpret the results obtained and justify how the discrepancy is resolved. Submit the written report according to	The teacher sets the objectives of the topic. The student reads (outside the classroom) the readings proposed for understanding the topic The teacher explains the basic concepts of the subject through slides via virtual class on the MS Teams platform. The student analyzes the immune response and its relationship to transfusion medicine. The student identifies the important antibody types of transfusion medicine for	Basic concepts of immunology: cellular and humoral immune response. Antigen-antibody reaction: factors that modify it. Classification of antibodies of clinical importance in the blood bank Blood systems of clinical importance in transfusion medicine: ABO system	Chapter 1 Dr. Alfredo Radillo González. Transfusion Medicine Third Edition. Publisher: Prado Year: 2017 Electronic platform Computer with internet access for virtual classes through the MS Teams platform. Moodle platform for evidence review.

		taking		

Evidence of learning	Performance criteria	Learning activities	Contents	Resources
	the established times The report includes personally identifiable data.	decisions at the blood bank . The student analyzes the factors that modify the antigen-antibody reaction for the correct interpretation of immunohematological tests performed in the blood bank. The student individually prepares a diagram of the antigen-antibody reaction and submits it to the teacher. The teacher provides feedback on the antigen-antibody reaction scheme presented by the students as a group with guided questions. The student makes a written report of	Rh system Other antigens of clinical importance in the blood bank ABO and Rh systems in perinatal hemolytic disease. New technologies for blood typing, antibody studies	

Evidence of learning	Performance criteria	Learning activities	Contents	Resources
		resolution of ABO and Rh system discrepancies.		
		The student makes a comparative table of the systems of clinical importance in transfusion medicine. The professor explains how to resolve cases of discrepancies between the ABO and Rh systems using the MS Teams digital platform. The student works as a team to resolve cases of discrepancies in the ABO and Rh systems and presents the results obtained in class. The student investigates the new technologies for blood typing and antibody identification used in the blood bank.	ABO system, genetics and biochemistry of blood groups. Importance of the ABO system in blood transfusion. Rh system, genetics, biochemistry and nomenclature. Importance of the Rh system in blood transfusion. ABO and Rh systems in perinatal hemolytic disease Other blood systems of clinical importance. New technologies for blood typing, antibody studies.	Chapter 2, 3, 6, 7 and 8 Dr. Alfredo Radillo González. Transfusion Medicine Third Edition. Publisher: Prado Year: 2017 OFFICIAL MEXICAN STANDARD NOM - 253-SSA1- 2012 For the disposal of human blood and its components for therapeutic purposes. Electronic platform ABO system discrepancy cases provided by the teacher.

Evidence of learning	Performance criteria	Learning activities	Contents	Resources
				Computer with internet access for virtual classes through the MS Teams platform. Moodle platform for evidence review.
	Attend the laboratory on time. Put your lab manual into practice. Provide a flow chart of the practice to be performed. Reports and validates the results of the samples analyzed during the practice.	The professor presents the theory of practice in the laboratory using slides through the digital platform MS Teams. The student creates a flow chart to support the practice. The student performs the practice of determining blood type using the direct and indirect method individually.	Determination of the ABO System: Direct and Indirect Method. Determination of subgroups of A Determination of the Rh System Determination of weak D Resolution of discrepancies in the ABO system.	Blood Bank Practice Manual 3rd Edition 2018. Department of Pathology Clinic Equipped practical laboratory (face-to-face practices). Biological blood samples with and without anticoagulant.

Evidence of learning	Performance criteria	Learning activities	Contents	Resources
	Submit your laboratory report within the established time. Include bibliographical references in the practice questionnaire. Interpret the results of the samples processed in practice individually. Complies with laboratory regulations.	The student determines the subgroups of A. The student performs the practice of determining the Rh and weak D system. The student prepares a report of the results obtained during the practice. The student answers the report of the practice of determining the ABO system **(weighted activity 1.1)** The student answers the practice report the determination of the Rh system **(weighted activity 1.2)** The student analyzes a problem sample and reports the results obtained. **(weighted activity 1.3)**		Inserts of the reagents used during the practice. Computer with internet access for virtual classes through the MS Teams platform. Moodle platform for evidence review (virtual practices)

Phase 2. Guidelines for the selection of blood donors.

Competence element(s): Analyze the acceptance and rejection criteria of candidates for blood donation, according to NOM -253-SSA1 -2012, to define whether a candidate is suitable to donate blood.

Evidence of learning	**Performance criteria**	**Learning activities**	**Contents**	**Resources**
2. Conceptual map of the guidelines for the selection of the donor according to current regulations.	The conceptual map includes: Basic requirements for donor selection. Permanent and temporary rejection factors Donor's medical history Special categories of donors. Types of donations (allogeneic, altruistic, autologous, apheresis). Bibliography. Cover with identification data.	The teacher sets the objectives of the topic. The student reads (outside the classroom) the readings proposed for understanding the issue The teacher explains the basic concepts of the subject through slides through the digital platform MS Teams. The teacher introduces the contents of the topic by asking questions.	General guidelines for the selection of the donor. Extraction of blood units and blood components for use allogeneic Blood extraction, complications and management. Extraction of blood components by apheresis.	Chapters 11 and 12 Dr. Alfredo Radillo González. Transfusion Medicine Third Edition. Publisher: Prado Year: 2017 OFFICIAL MEXICAN STANDARD NOM - 253-SSA1- 2012 For the disposal of human blood and its components for therapeutic purposes.

	map on time . is devel oped individually as an electronic document.	The student brings the NOM-253-SSA1-2012 in electronic or printed form. The student makes a conceptual map of the guidelines for selecting individual donors. The student makes a virtual visit to the blood bank to observe the donation process and makes a report of the activities carried out during his stay in the donor area (weighted activity).	Categories of allogeneic donors. Therapeutic bloodletting	Electronic platform Computer with internet access for virtual classes through the MS Teams platform. Moodle platform for evidence review.
		First partial written evaluation **(weighted activity 2.1)**		

Fase 3. Processing of blood components

Competence element(s): Analyze the blood processing conditions, in terms of the separation, fractionation and conservation techniques of the blood components, and taking into account the quality criteria established in NOM-253-SSA1-2012, to obtain blood components that meet the required quality criteria.

Evidence of learning	**Performanc e criteria**	**Learning activities**	**Contents**	**Resources**
3. Comparative table of the processing conditions of blood components in terms of separation, fractionation and conservation techniques, taking into account the quality criteria established by current regulations.	The comparison table includes: Type of blood component Volume Shelf life Storage temperature Quality control Special features Bibliography. Cover with identification data. The information in the table must be clear	The teacher sets the objectives of the topic. The student reads (outside the classroom) the readings proposed for understanding the topic. The teacher explains the basic concepts of the subject through slides using the MS Teams digital platform. The student brings the NOM-253-SSA1-2012 in electronic or printed form. The student makes a	Common provisions for processing blood and blood component units blood. Methods for separating and fractionating blood units and components blood Fractionation route to obtain components blood. Quality control requirements for units of	Chapter 15. Dr. Alfredo Radillo González. Transfusion Medicine Third Edition. Publisher: Prado Year: 2017. Chapter 17. Dr. Alfredo Radillo González. Transfusion Medicine Third Edition. Publisher: Prado Year: 2017 OFFICIAL

		comparative table of the		STANDARD MEXICAN NOM 253-SSA1- 2012

	It is developed individually, as an electronic document. Send it by mail or upload it to the electronic platform on the established date.	storage and preservation conditions of individual blood components. The teacher provides feedback on the comparative table of storage and preservation of blood components through guided questions. The student interprets and validates a report of results obtained from the quality control of a blood component according to the criteria established by current regulations.	blood and blood components Storage and preservation of blood units and blood components Process of discharge and final destination of the blood units and blood components obtained. Product release and labeling process	For the disposal of human blood and its components for therapeutic purposes. Electronic platform Computer with internet access for virtual classes through the MS Teams platform. Moodle platform for evidence review.
4. Written report of the interpretation of the results report	It is based on current regulations, for the release of the	The teacher sets the objectives of the topic.	Analysis of serological tests performed on blood units and blood components	

of a blood donor profile.	blood components. Analyzes the results obtained from serological tests performed on blood donors and completes them according to the checklist provided. Create a report including the algorithms established by current regulations The report includes personal identification data and bibliographic references.	The student reads (outside the classroom) the readings proposed for understanding the topic. The teacher explains the basic concepts of the topic through slides. The student attends the class with the NOM - 253- SSA1 -2012 in electronic or printed form. The student analyzes the validation algorithms suggested by current regulations for the release of blood units . The student prepares a report of the results obtained during the practice: Quality control of reagents **. (Weighted activity 3.1)**		
		Second partial written evaluation of the phase		

		3 **(weighted activity) 3.2)**		

FASE 4. Compatibilidad y transfusión de componentes sanguíneos

Elemento(s) de competencia: Analizar las pruebas de compatibilidad sanguínea, para la detección de anticuerpos irregulares y evitar las reacciones transfusionales, de acuerdo a los protocolos establecidos por la normatividad vigente.

Evidence of learning	**Performance criteria**	**Learning activities**	**Contents**	**Resources**
5. Written report on the resolution of clinical cases of compatibility tests and identification of irregular antibodies.	Resolve the report of the clinical cases provided. Cover with the data of ID He develops it individually as a document electronic. Send by email or upload to platform electronics on date established.	The teacher sets the objectives of the topic. The student reads (outside the classroom) the readings proposed for understanding the topic. The teacher explains the basic concepts of the subject through slides via a virtual session on the MS Teams platform. The student attends the class with the NOM - 253- SSA1 -2012 in electronic or printed form.	Administration and indication of blood components in adult and pediatric patients Whole blood Red blood cell concentrate, Platelet concentrate Fresh frozen plasma, Cryoprecipitate Plateletpheresis	Chapters 22 and 23 Dr. Alfredo Radillo González. Transfusion Medicine Third Edition. Publisher: Prado Year: 2017 OFFICIAL MEXICAN STANDARD NOM - 253-SSA1- 2012 For the disposal of human blood and its components for therapeutic purposes.

Evidence of learning	Performance criteria	Learning activities	Contents	Resources
		The student makes the comparative table of the administration of blood components. The professor provides feedback on the comparative table of administration and indication of blood components. The student solves a clinical case of incompatible cross-matches and submits a report. The teacher provides feedback on the interpretation of the compatibility tests The student makes a diagram of the approach to an incompatible cross-match test **.**	Plasmapheresis Reconstituted blood Tests of Blood compatibility: Phases of cross-matching Interpretation of test results of compatibility Protocol to follow in the blood bank before a crossmatch incompatible. Techniques for tracking irregular antibodies. Interpreting irregular antibody screening results Alternatives for the use of the blood components	Manual Guide for the clinical use of blood Secretary of Health Electronic platform Computer with internet access for virtual classes through the MS Teams platform. Moodle platform for evidence review.

Evidence of learning	Performance criteria	Learning activities	Contents	Resources
		The student makes a diagram of the approach to a transfusion reaction	Transfusion alternatives in patients with perinatal hemolytic disease.	
			Classification of the transfusion reactions: Immunological, no Immunological Clinical manifestations and etiology of the main transfusion reactions. Algorithm of the transfusion reactions immediate and late.	Chapters 18, 19 and 20 Dr. Alfredo Radillo González. Transfusion Medicine Third Edition. Publisher: Prado Year: 2017. Chapters 35, 36 and 37 Dr. Alfredo Radillo González. Transfusion Medicine Third Edition. Publisher: Prado Year: 2017
	Attend the laboratory on time. Take your lab manual to the practice.	The teacher explains the theory of the practice in the laboratory using slides.	Determination of compatibility tests (blood crossmatch). Direct Coombs determination.	Blood Bank Practice Manual 3rd Edition 2018. Department of Pathology Clinic

Evidence of learning	Performance criteria	Learning activities	Contents	Resources
	Submit the laboratory report within the individually established time. Complete the corresponding session of individual practice in a clean and correct manner. Complies with laboratory regulations. Provide a flow chart of the practice to be performed. Reports and validates the results of the samples analyzed during the practice.	The student creates a flow chart to support the practice. The student performs the mentioned practices The student prepares a report of the results obtained during the practice: Determination of compatibility tests. Direct Coombs determination. Indirect Coombs determination (antibody screening) **(Weighted Activity 4.1)** The student analyzes a sample compatibility test problem. **(weighted activity) 4.2)** The student answers the third partial written evaluation **(weighted activity 4.3)** corresponding to the phase 4	Indirect Coombs determination (antibody screening) Quality control of reagents.	

7. Comprehensive evaluation of processes and products:

Stage		%
1	**Evidence 1. Written report of the interpretation and analysis of the tests used in transfusion medicine to identify discrepancies in the ABO and Rh systems.**	5
	Weighted Activity 1.1	5
	Weighted Activity 1.2	5
	Weighted Activity 1.3	6
2	**Evidence 2. Conceptual map of the guidelines for donor selection according to the current regulations.**	4
	Weighted Activity 2.1	8
3	**Evidence 3. Comparative table of the processing conditions of blood components in terms of separation, fractionation and conservation techniques, taken from the quality criteria established by current regulations.**	4
	Evidence 4. Written report of the interpretation of the results report of a profile of blood donor. -	5
	Weighted Activity 3.1	8
	Weighted Activity 3.2	5
4	**Evidence 5 Report written by the resolution of clinical cases of compatibility tests and antibody identification irregular.**	5
	Weighted Activity 4.1	15
	Weighted Activity 4.2	7
	Weighted Activity 4.3	8

Stage		%
Integrative learning product		10
	Total	**100%**

8. Integrative learning product:
PIA: Written evaluation of clinical cases in transfusion medicine and blood banking

9. Sources of support and consultation:

AMMTAC. Mexican Association of Transfusion Medicine, AC http://www.ammtac.org Martínez, J.

(2012) A. Mexican Association of Transfusion Medicine 10 years. Mexico: AMMTAC. Radillo-

González, A. (2017). Transfusion Medicine. Third edition. Mexico: Prado publishing house.

Rodriguez - Moyado, H. (2014) The Blood Bank and Transfusion Medicine. Mexico: Panamericana publishing

house. Romero – Rodriguez, T. (2010) Manual of Techniques and Procedures in Blood Bank. Mexico: Prado

publishing house.

Ministry of Health. (1994). NOM-017-SSA2-1994, For Epidemiological Surveillance. Mexico: Official Journal of the Federation. Retrieved April 8, 2017 from http://www.salud.gob.mx/unidades/cdi/nom/017ssa24.html Ministry of Health. (2002).

NOM-087-ECOL-SSA1-2002 Environmental protection - Environmental health - Biological-infectious hazardous waste - Classification and management specifications. Mexico: Official Journal of the Federation. Retrieved April 8, 2017 from http://www.salud.gob.mx/unidades/cdi/nom/087ecolssa.html Ministry of Health. (2012).

NOM-253-SSA1-2012. For the disposal of human blood and its components for therapeutic purposes. Mexico: Official Journal of the Federation. Retrieved April 8, 2017 from http://dof.gob.mx/normasOficiales/4917/salud3a/salud3a.html